CADD Introduction
Computer Aided DRAFTING and DESIGN

1. **There is a better way.**
   - **a.** Standards are a guide to get us started. We're doing custom hot rods, so tailor them for your project.
   - **b.** Standards are generic. Remove project specific notes: (I.e. Contractor to provide security fencing around 55 gallon hazardous waste containers on site.)
   - **c.** We're 'designers' not cad jockeys – see http://www.coroflot.com/public/main_frame.asp?individual_id=6719
   - **d.** Back in the day, all drafting was done by old grumpy men with hunched backs, so be thankful for your carpel tunnel and bad vision.
     i. Surface features and hatches were light lines.
     ii. Objects that were a silhouette were medium lines.
     iii. Cut items were dark lines.
     iv. Walls were shaded, usually on the back, with a red pencil, to make them 'pop' a bit.
     v. Above is a long dashed line. Below is a short dashed line.

2. **Say it, and only once.**
   - **a.** Keep it simple for the builder to understand. Avoid complicated cross referencing.
   - **b.** Label lines thru text and legends. If they know what it is, they can build it.
     i. Give it a scale bar. Add a human figure, unless you think nobody would ever want to come and enjoy your fantastic design.
     ii. North is up, even in Australia.
   - **c.** Drafting is a graphic design exercise. You're making an assembly book describing the Eighth Wonder of the World. Show you care, make it legible. Make it the most beautiful drawing set you've ever seen. Make it Frank cha-Ching bling bling in the aesthetics department.
     i. The company logo is HOLY. Use a unique font, make it tamper resistant, and be consistent with your business cards, websites, and coffee mugs. Persecute offensive users.
     ii. Use one font size for all general text. Use a larger font size for titles.
     iii. Serif fonts, like times, are 'easier to read' printed. Sanserif (without) are easier on the screen.
     iv. Use fonts that are available on all cad machines. Arial is pretty standard.
     v. Orient paper the same way, and place plans and notes in the same place from page to page.
   - **d.** Thin drawing sets make buildings look simpler to build. San Diego Architect Lew Dominy says building cost is based on drawing weight.
   - **e.** Figure it out now and document it. It's a construction change latter.
     i. Issuing a construction drawing: one sheet of paper and your labor.
     ii. Issuing a construction change: the request for information, the drawing, the explanation of the drawing, the transmittal, the fax, the distribution to subs, the budget, the revised budget, the change order, and the acceptance of the change order.
   - **f.** Local building departments provide checklists for what is required on drawing submittals. These are valuable guides for drafters to know what to put on the plans, and provide quality control to make sure it gets done.
   - **g.** Ever read a specification? Did you read the soils report? How about that BMP manual? How many special inspections are required in the structural calculations to make them work?

3. **Cad is a fleeting moment in time. *"Paper"* is forever.**
   - **a.** Analog ***"Paper"*** allows you to keep a design thought forever. It's never outdated. You can show ***"Paper"*** to your children, and your children's children, long after electricity is obsolete. Capture those cad moments on ***"Paper".***
   - **b.** ***"Paper"*** can be modified by architects with red pens and pencils. (Other colors are not reliable.) Changes by cad monkeys can be tracked on ***"Paper"*** with highlighters, and comments added with other fantastic colors, like green and blue.
   - **c.** ***"Paper"*** can be transported easily to other places, like your fellow cad monkey's desk, or building rooftops, or your back pocket. ***"Paper"*** is easily accessible at your local gas station pump, watering hole, and even your grandmother's house.
   - **d.** Thin sheets of ***"Paper"*** can be layered just like CAD. You can even load and unload layers of ***"Paper"***, just like xrefs. And you can share this ***"Paper"*** with your fellow design monkeys, allowing you to work on projects simultaneously.
   - **e.** ***"Paper"*** is extremely gratifying with bad design too. It can be violently crumpled up into a neat ball, shredded, and incinerated. ***"Paper"*** can be redeemed thru recycling, into new ***"Paper"*** to convey good ideas.

f. ***"Paper"*** glued together can form three-dimensional spaces. Complex flythroughs can be performed real time by simply rotation by any user of ***"Paper"***, at any time, without complicated software, outdated computers, and irate model monkeys.

g. ***Bonus tool.*** Hands can be used when ***"Paper"***, is scarce. Santiago Calatrava uses hands to describe structure. Eric Owen Moss uses hands to emphasize design ideas. Get enough hands together, and you can describe space. Hands can be used to understand the speed at which to move an animation. The left hand can be used to understand the XYZ axis, middle finger, first finger, thumb, respectively.

4.  **is for COPY,** **R** **is for ROTATE**

a. The goal is to get all key commands on the left hand, all mouse movements on the right hand. With a 17" monitor 24" away from your eyes, let your eyes slightly go out of focus. You'll find that you can pump cad all day long only moving your left hand fingers and right hand wrist.

i. CR is for CIRCLE
ii. D is for "drawing" LINES (or just get bigger hands to reach the L key.)
iii. G is for PLINES
iv. GG is for PLINEDIT
v. V is for move

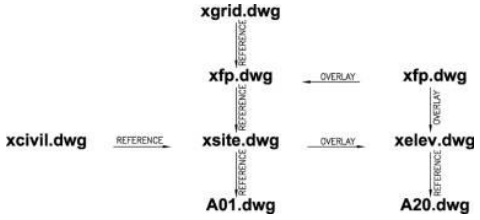
b. "Buttons" and Lisp routines can make monotonous chores easier.

i. (^C^C_audit y _-purge a "*" n) will purge and audit all on the click of a button.

c. Bonus: did you know photoshop has keycuts too? Hover over an icon to see the key command.

5. Xref your 'model' and 'Layout1' your sheet files

a. Xref files are for repeated information, drawn in model space at actual size, and include important notes. File names start with "x" so they end up on the bottom of a layer stack. 'attach' grid xrefs. 'overlay' others.



b. Sheet files are for plotting scaled xrefs, with notes, legends, and schedules. Repeated notes should be xrefs. Cool cad monkeys use the same Keyed Notes (two words) for elevations, sections, interiors, and even details.

c. Irritate your coworkers and consultants with complicated XCLIP's and circular XREF's that no-one can figure out.

6. Share

a. Keep up to date files on a servers that everyone uses. Keep old files in an "Archive" folder.

b. Keep a stock library of blocks, details, templates, and layering for everyone to use. Clean out the personal closets of cad junk and pass it on. Have one person in charge of organization, and email updates for them to add.

c. Point everyone's computer to a common place for standard components and plot styles through the options dialog and design center. Create a standard Profile everyone starts with.

d. Let users customize their computer to suit their needs. Find the common link that everyone uses, and make it part of the standard. Add shortcuts thru the ADCENTER. Add shortcuts thru the OPEN dialog box, ("right-click" in the grey, "Add…", right-click on the folders and change names via "Properties…")

7. Know your Terms

a. Analog vs Digital

i. ANALOG is control thru mechanical movement.
ii. DIGITAL is control thru electrical movement.

b. Images

i. RASTER images are defined by individual squares of color. Includes photoshop files. Use 150 DPI for color images seen at a distance. Use 200 DPI for printed images and B&W. No need to go past 300 DPI. And for gods sakes, if its web-based use 72 dpi.
ii. TIFF images are for permanent archiving with no compression degradation. For graphics that will be changed and updated. Results in a large file.
iii. JPEG images are compressed by grouping areas of color. Degradation occurs thru each save. Results in a small file.
iv. VECTOR images are lines controlled by points. Includes PDF, CAD and Illustrator files.

c. Fonts
i. SHX is a single line vector font.
ii. TRUE TYPE is a vector controlled font with a fill.

d. Modeling
i. PROCEDURAL are standard images controlled thru descriptive modifiers. Starts with the Platonic idea of an object, like DOG. Adds modifiers like, black, 2' high, 4' long, etc.
ii. FACE vs SOLID modeling: Face modeling defines 3D objects with vectors to define triangles of surface. These surfaces compose an object. SOLID modeling uses vectors to describe exterior extents of an object.

e. Typical materials callouts, unless noted otherwise, per specification and/or drawings, (see schedule.) Sim. Find a common ground for material callouts on details, and create standard notes for everyone's use.
i. Screeds – 'j' metal, vinyl, epoxy coated, & galvanized screeds, plaster screed, reglet, stucco stop.
ii. Waterproofing – 'Jiffy Seal', bituthene, self adhered waterproofing membrane, spray applied waterproofing, building paper, kraft paper, caulk with backer rod, CTBOOI (caulk the bajezuz out of it), mastic, slip sheet.
iii. Gypsum Board – 'Drywall', GYP, gyp. Brd., Type 'x' gypsum board, plaster board, interior plaster.
iv. Stucco – exterior plaster, stucco over building paper over lath, lath and plaster, eifs.
v. Fasteners – SMS, sheet metal screws, #8, #6, 12d, s.s.s.m.s.

8. Tolerance

a. Distance is a relative to tasks:
i. US foreign policy in Iraq: 5 mile radius.
ii. NASCAR fans: the quarter mile.
iii. New Yorkers: blocks to the nearest amenity
iv. Olympic athletes: the quarter inch.

b. Buildings construction is the same:
i. Steel workers measure by the 1/32", otherwise the bolts don't fit.
ii. Woodworkers by the 1/16", otherwise you've gotta putty it.
iii. Masons 1/4" of grout in 8" of block.
iv. Drywallers by the 1/2", because anything more would take too much plaster to cover up.
v. Framers by 1/4".
vi. Concrete foundation formers by 1".
vii. Heavy equipment operators by 2".
viii. Shoring contractors by 12".

c. Design - and the CAD that reflects it: avoid complicated fractions. Keep the cad to the nearest inch.
i. Construction documents should have total precision and be dialed in. Perfect!
ii. Design development should work to the nearest 2", as we're looking at framing and its effectiveness.
iii. Schematic design could be within a foot, the 'wiggle' of a pen on paper finding appropriate areas.
iv. Preliminary design around 6', the 'wiggle' of the project architect at 12 midnight, working on 10 pots of coffee scribbling big fluffy relationships diagrams.

9. Document Office Standards in Common Binder and on Network.

a. General Office Policies
i. Copy, fax, shipping, courier, and Plotting Costs
ii. FTP and email procedures
iii. Workstation Locations
iv. Vacation Logs
v. File organization for the office
vi. Binder and material database
vii. Company font, logo, and layout

b. CAD
i. Lineweight Settings

ii. Plotter Setups via Screen Capture
iii. File organization system for drawings
iv. Typical sheet index
v. Typical sheet layout
vi. Blocks catalog

c. Frank Super T Ternaski's Mac Truck Theory: If a project manager walks out of the office and gets hit by a MAC truck, anyone should be able to take over the project.

10. Use the other standards

a. Robert's rules of Conduct: call to order, unfinished business, new business, announcements, adjournment. Obtain the floor, debate, make a motion, second the motion, vote by voice or consent, table or postpone a motion. Can be used for CAD and important 'better beer'/NASCAR debates.
b. ICBO reports at http://www.icc-es.org
c. Fire rated gypsum wall assemblies and stc ratings from http://www.gypsum.org/comp.html
d. The AutoCAD 'help' menu, and discussion boards at Autodesk at http://discussion.autodesk.com/index.jspa
e. Suppliers like Industrial Metal Supply at http://www.imsmetals.com/ and McMaster at http://www.mcmaster.com/
f. Mapping at http://www.sangis.org